Advant® OCS
with Master software

Object Support via Advant® Fieldbus 100
Advant Controller 450

User’s Guide

3BSE 014 762R0001

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Chapter 1 Introduction

1.1 Before You Begin

The document describes how the QC07-COM41 program module can provide AIS, DIS, MB, MI, MIL, MR objects in Advant Controller 110/160 to be operated from an Operator Station connected to an Advant Controller 450.

The Advant Controller 450 contains two PC elements (COM-AIS and COM-DIS) for handling the updating of the internal data base elements (AIEV and DIEV) and sending commands to the Advant Controller 110/160 AIS and DIS objects via Advant Fieldbus 100. Some program logic shall be built into the application program to establish the communication and handle the exchange of information and data.

The operators view of the objects represented the data base elements AIS and DIS in Advant Controller 110/160 is an Analog Input respectively a Digital Input object. The following functions are supported:

- Acknowledgment of alarms
- Blocking of events and alarms
- Blocking of process data update
- Setting process data value.

In addition can the objects represented by the data base elements MI, MB, MIL, MR in Advant Controller 110/160 be handled in such a way that values can be sent from the COM-M PC element in Advant Controller 450. The value(s) are set in the COM-M PC element and thereafter commanded to be sent by triggering terminal(s) of the same PC element. The number of values to handle is specified at configuration of the COM-M PC element. All values can be triggered in one execution. The values will be sent in a predetermined order defined by the COM-M PC element. An operator interface can be built using suitable objects in Advant Controller 450 being operated by the Operator Station, together with some program logic in the application program.

1.2 Equipment Requirements

1.2.1 Hardware

The function "Object Support via Advant Fieldbus 100" is defined for the Advant Controller 450 ∗2.0 (or later versions) together with either Advant Controller 110 ∗2.1 (or later versions) or Advant Controller 160 ∗1.0 (or later versions) and an Advant Station 500 Operator Station ∗1.5 (or later versions).

1.2.2 Software

The program module QC07-COM41 is included in the Advant Controller 450. The module designation depends on the controller version in use, the following is a requirement for the Advant Controller 450:

QC07-COM41 *1.0 or later versions for Advant Controller 450

For the controllers Advant Controller 110/160, software module opt 3, Events is required, but the controller version have to include the data base elements AIS, DIS, MI, MB, MIL, MR.

The following is a requirement for the Advant Controller 100 Series:

Advant Controller 110 *2.1 or later versions

Advant Controller 160 *1.0 or later versions

1.2.3 Tools

The function “Object Support via Advant Fieldbus 100” requires following for Windows 3.11:

- AdvaBuild for Windows 1.4 or later versions.

The function “Object Support via Advant Fieldbus 100” requires following for Windows NT:

- AMPL Control Configuration 1.4 or later versions.

1.3 How to Use This Book

This book is organized into chapters and sections as shown in Figure 1-1.

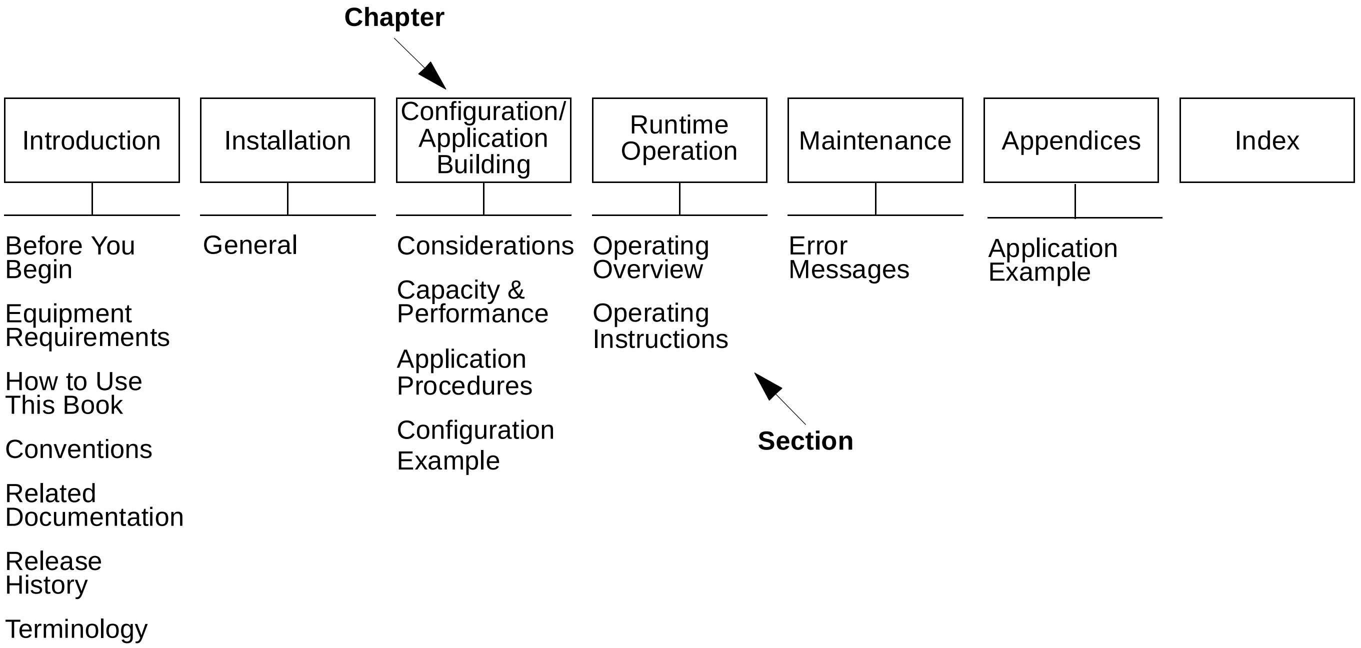


Figure 1-1. Organization of Manual

1.4 Conventions

The following conventions are used throughout this manual for the presentation of material:

- In a syntax rule statement or example, a word in **boldface** represents a reserved, keyword or string.
- References to other documents are in *italic*.

1.5 Related Documentation

Table 1-1 lists all documentation related to Object Support via Advant Fieldbus 100.

Table 1-1. Related Documentation

Title	Description
Advant Controller 110 User's Guide	Contains a description of Advant Controller 110.
Advant Controller 160 User's Guide	Contains a description of Advant Controller 160.
Advant Controller 450 User's Guide	Contains a description of Advant Controller 450.
Advant Station 500 Series Operator Station User's Guide	Provides a general functional overview of the Operator Station, guidance on where to find information on a specific subject and instructions on station-level procedures such as start-up and shutdown, connection peripherals, and so on.
AdvaBuild for Windows with Function Chart Builder User's Guide	Describes how to program an Advant Controller via Function Chart Builder.
AMPL Configuration Advant Controller 400 Series Reference Manual	Instructions for the configuration and application programming of Advant Controller 410/450 systems. The topics are: AMPL configuration principals, application programming, commissioning and testing, on-line editing, documentation, backup and transfer of application data.
Data Base Elements Advant Controller 100 Series Reference Manual	Data for all data base elements in Advant Controller 110.
Data Base Elements Advant Controller 160 Reference Manual	Data for all data base elements in Advant Controller 160.

Table 1-1. Related Documentation (Continued)

Title	Description
Data Base Elements Advant Controller 400 Series Reference Manual	Data for all data base elements in Advant Controller 410/450.
PC Elements Advant Controller 100 Series Reference Manual	Data for all PC elements in Advant Controller 110
PC Elements Advant Controller 160 Reference Manual	Data for all PC elements in Advant Controller 160.
PC Elements Advant Controller 400 Series Reference Manual	Data for all PC elements in Advant Controller 410/450.
Advant Fieldbus 100 User's Guide	Describes how to configure, install and maintain communication using Advant Fieldbus 100.

1.6 Release History

Table 1-2 lists the major milestones in the development of Object Support via Advant Fieldbus 100.

Table 1-2. Release History

Version	Description
1.0	This is the initial Object Support via Advant Fieldbus 100.

1.7 Terminology

The following is a list of terms associated with Object Support via Advant Fieldbus 100 that you should be familiar with.

Term	**Description**
AC 110	Advant Controller 110
AC 160	Advant Controller 160
AC 450	Advant Controller 450
AF 100	Advant Fieldbus 100
AMPL	ABB Master Programming Language
AS 500 OS	Advant Station 500 Operator Station
QC07-COM41	Advant Controller 450 program module name
FCB	AdvaBuild Function Chart Builder
MB 300	MasterBus 300
PC element	ABB Master Programming Language (AMPL) programming element
DB element	ABB Master Programming Language (AMPL) data base element

Chapter 2 Installation

2.1 General

Verify that the program module for QC07-COM41 is present on the Advant Controller 450 program card for system software for your Advant Controller 450. No other extra action is needed for installation of this software function.

Chapter 3 Configuration/Application Building

3.1 Considerations

The PC elements COM-AIS, COM-DIS and COM-M are described in details in the *PC Elements Advant Controller 400 Series Reference Manual*, see also the *Data Base Elements Advant Controller 100 Series Reference Manual*.

Please refer to Section 1.5, Related Documentation.

The "Object Support via Advant Fieldbus 100" functionality can basically be divided into two groups:

1. Using the Advant Controller 400 Series PC elements COM-AIS and COM-DIS to operate the data base elements AIS and DIS in the Advant Controller 110/Advant Controller 160. The AIS and DIS objects are operated from an Advant Station 500 Operator Station and the commands are sent via the Advant Fieldbus 100. Following commands can be used:
   a. Acknowledgment of Alarm -
   It is possible to acknowledge an alarm from any of the object types AIS or DIS in an Advant Controller 110/Advant Controller 160.
   b. Alarm Block command -
   It is possible to block an alarm from any of the object types AIS or DIS in an Advant Controller 110/Advant Controller 160.
   c. Blocked command -
   It is possible to prevent an object of types AIS or DIS in an Advant Controller 110/Advant Controller 160 from being updated from its source. With input blocked this object can be manipulated from the Advant Station 500 Operator Station.
   d. Setting Value command -
   It is possible to set a value in any of the object types AIS or DIS in an Advant Controller 110/Advant Controller 160 from the Advant Station 500 Operator Station. This requires that the object previously has been blocked.
2. Using the Advant Controller 400 Series PC elements (COM-M (C1, C2, C3)) to send commands to MI, MB, MIL and MR objects in Advant Controller 110/Advant Controller 160.

3.1.1 Communicating with an AIS Object

For the operation of an AIS object, following arrangement is needed for the COM-AIS PC element:

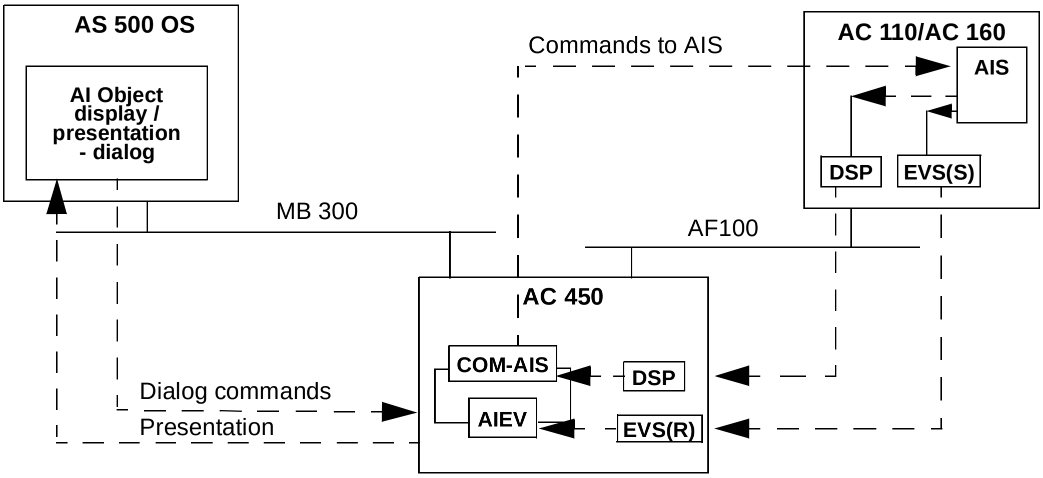


Figure 3-1. COM-AIS Configuration Overview

3.1.2 Communicating with an DIS Object

For the operation of an DIS object, following arrangement is needed for the COM-DIS PC element:

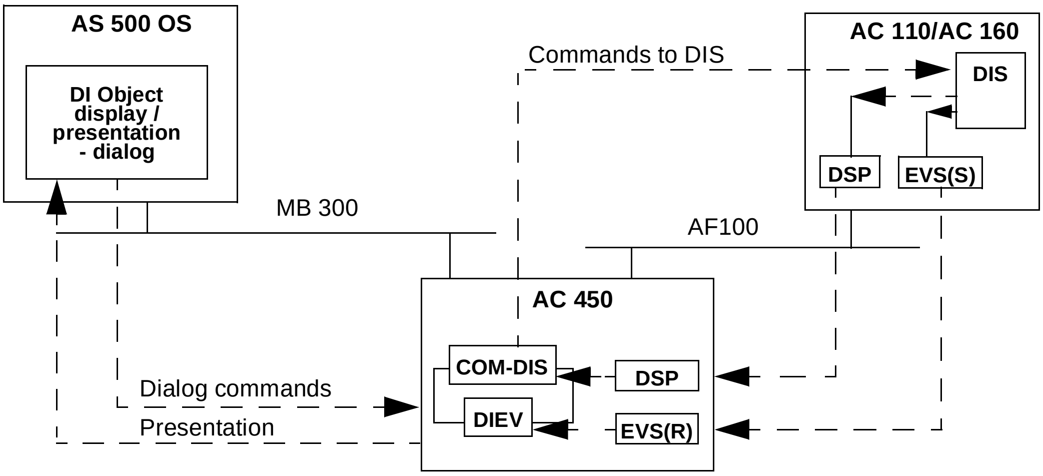


Figure 3-2. COM-DIS Configuration Overview

3.1.3 Communicating with MI, MB, MIL and MR Object

For the command sending to MI, MB, MIL and MR objects, Figure 3-3 shows the arrangement needed for the configurations respectively:

Table 3-1. Communicating with MB, MIL, MI and MR Objects.

AC 450 PC Element	AC 110/AC160 DB Element
COM-M(x,IL,0)	MB
COM-M(x,IL,1)	MIL
COM-M(x,I,0)	MI
COM-M(x,R,0)	MR

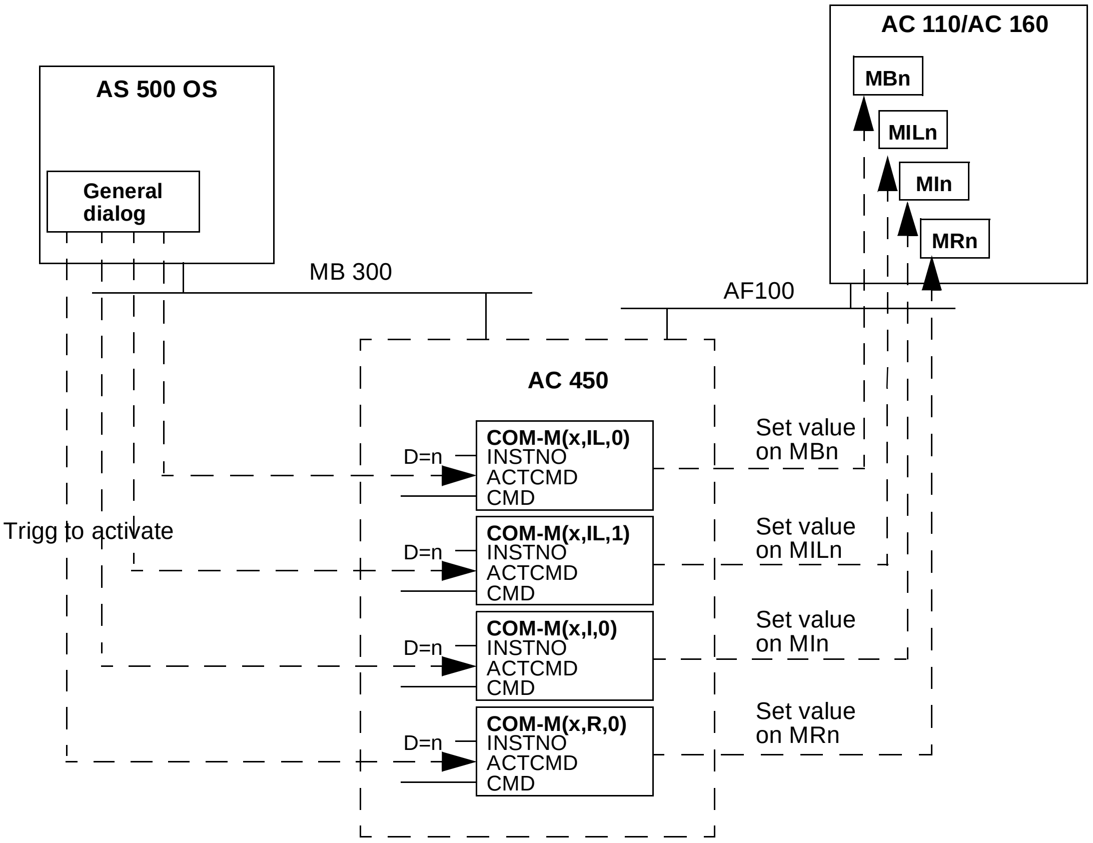


Figure 3-3. COM-M Configuration Overview

3.2 Capacity and Performance

3.2.1 Guidelines for Choosing Cycle Times

Which cycle times to use, with respect to DSP data base element and PC control modules for the COM-AIS, COM-DIS or COM-M PC elements, is basically up to the application designer. It is important to keep total CPU load for the controller in mind.

3.2.1.1 Typical Values

Cycle Times

Typically 1 second is used for COM-AIS/COM-DIS PC elements control module, and 1024 ms cycle-time for the DSP data base element in Advant Controller 450. This configuration of 1000 COM-AIS/COM-DIS PC elements in one Advant Controller 450 contributes with approximately 10% CPU load in the Advant Controller 450.

For the Advant Controller 110/160 normal guidelines for CPU load restrictions must be applied. Typically 1024ms is used for control module and DSP data base element respectively in Advant Controller 110/160 also. Normally the control module time equals the DSP data base element cycle time, but this relation might be altered if the TIMEOUT parameter (of the COM-AIS, COM-DIS or COM-M PC elements in Advant Controller 450) is properly adjusted.

Regarding command response times. For the COM-AIS and COM-DIS PC elements the operator of the Advant Station 500 Operator Station will have the feedback from the AIEV and DIEV objects via COM-AIS/COM-DIS PC elements immediately. If communication with the Advant Controller 110/160 is broken then the corrective response time to the operator depends on the time specified on the TIMEOUT parameter in the COM-AIS/COM-DIS PC elements.

Load, Memory and Execution Time Calculations

Refer to *PC Elements Advant Controller 400 Series Reference Manual* for execution time and application memory consumption calculations on COM-AIS, COM-DIS and COM-M PC elements.

Refer to *Advant Controller 450 User´s Guide* for memory consumption calculations for the AIEV and DIEV data base elements.

Refer to *DB Elements Advant Controller 400 Series Reference Manual* or *Advant Fieldbus 100 User´s Guide* for calculating load on Advant Fieldbus 100 when using DSP data base elements at different cycle times.

3.3 Application Procedures

3.3.1 Configuration of COM-AIS

The configuration of a single COM-AIS PC element includes the following configuration rules in Advant Controller 450 application. The configuration of the COM-AIS PC element also requires an object of type AIS to be configured in the Advant Controller 110/160.

Configuration rules:

1. **General**

   Remember that there is a one-to-one relation between AIEV data base element and, the COM-AIS PC element in Advant Controller 450 and the AIS data base element in Advant Controller 110/160.

2. **Advant Controller 450 Application**

   For each AIS object in Advant Controller 110/160 the following set of data base and PC elements is need in Advant Controller 450:

   - One COM-AIS PC element
   - One DSP data base element
   - One DAT(R) data base element (referenced by the DSP data base element). This data base element contains feedback (analog) value.
   - One DAT(B) data base element (referenced by the DSP data base element). This data base element contains status and feedback values.
   - One AIEV data base element.
   - One EVS(R) data base element referencing the AIEV. Needed if alarm handling is enabled in the COM-AIS PC element.

   a. **Data Base Element AIEV**
   Create one AIEV data base element for each AIS data base element to be handled by QC07-COM41, as described in guidelines for integration of Advant Controller 110/160 objects with AIEV/DIEV data base elements in Advant Controller 450. See also the example in Section 3.4, Configuration Example.

   b. **PC Element COM-AIS: Call Parameters**
   Insert a COM-AIS PC element. Alarm handling is enabled by setting the call parameter C1. Value setting is enabled by setting C2. Normally cycle time for CONTRM PC element is 1 second.

   c. **PC Element COM-AIS: TIMEOUT Terminal**
   Enter value for TIMEOUT terminal. This value controls when the COM-AIS PC element resets the status of the AIEV data base element if a command has been given without proper feedback from the AIS data base element in Advant Controller 110/160. To be able to catch all kinds of error codes if something goes wrong, a TIMEOUT value of 7 (seconds) or higher is recommended.

d. **PC Element COM-AIS: Identification Terminals**
Enter values on the terminals BUS, STATION, POSITION and INSTNO for identification of a single object in Advant Controller 110/160.

BUS = BUS number of Advant Fieldbus 100 bus between Advant Controller 450 and Advant Controller 110/160 hosting the AIS object.

STATION = number of wheel on back plane of the Advant Controller 110/160 hosting the AIS object.

POSITION = Position number of CPU hosting application with AIS object in Advant Controller 110/160 (count from left of rack 1,2,3 ...). If CPU redundancy, then choose the lowest number.

INSTNO = The instance number of the AIS in Advant Controller 110/160. When using FCB, select FILE - Open - DB, is derived from table column 1 (AIS object name in column 2, section INSTNO). One example: AIS13 in Advant Controller 110/160 imply INSTNO = 13.

e. **PC Element COM-AIS: Functional Connections**
Connect the terminals of COM-AIS PC element as shown in Figure 3-4.

NOTE

The DAT data base element terminals in Figure 3-4 must be used to get correct configuration.

f. **PC Element COM-AIS: Status and Error Terminals**
The BUSY, BUSY_STAT, ERR and ERRTYPE terminals are used for indication. If necessary these can be used (please refer to manual below) for connections.

g. **Activation of PC Program**
Start PC program (when DSP data base element has terminal VALID=1 and EVS(R) data base element has terminal WARNING=0). Advant Station 500 Operator Station through AIEV data base element in Advant Controller 450.

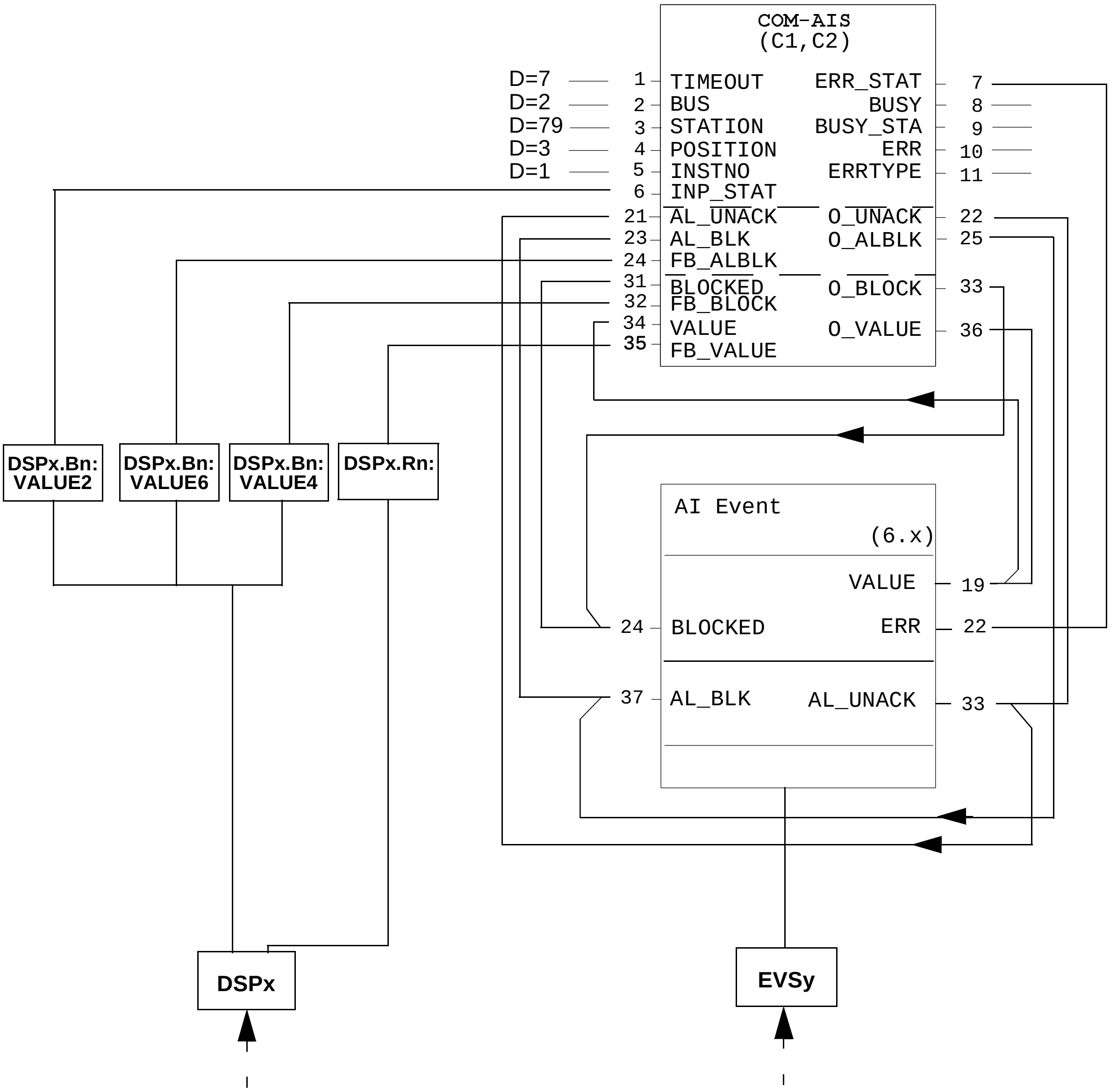


Figure 3-4. Configuration of COM-AIS (Terminal 1-5 Example Values)

3. **Advant Controller 110/Advant Controller 160 Application**

   Automatic Creation of DSP/DAT/EVS(S) Data Base Elements
   If you create an AIS data base element, all necessary DSP, DAT, and EVS(S) data base elements are automatically created as specified by values of the DS_COM, DSP_BUS, DSP_STAT, DSP_IDNT, DSP_CYCL, DSP_REF, EV_COM, EVS_IDNT, EVS_REF, EV_STAT, and EV_ERR terminals. All necessary references are automatically established between the AIS data base element and the DSP, DAT, and EVS(S) data base elements.

   DATs for value and status pertaining to an AIS data base element have to be referenced by one and the same DSP data base element.

   If the DAT(R) data base element for value of an AIS data base element is referenced by terminal REF*i* of a pertaining DSP data base element where *i* is defined by the terminal DSP_REF, then the DAT(IL) data base element for status of the same data base element is referenced by terminal REF*i*+1 of the same DSP data base element.

   NOTE

   You receive the status data set as a DAT(B) instead of DAT(IL). This is done so you do **not** have to use a CONV-IB PC element in the application program.

   The Function Chart Builder automatically creates the data base elements DSP, DAT, and EVS(S). These data base elements are in principle invisible for you (that is, they are not listed in the FCB together with separately created data base elements of these types). Nevertheless, be aware that they are created.

Refer to *PC Elements Advant Controller 400 Series Reference Manual* and *Data Base Elements Advant Controller 100 Series Reference Manual.*

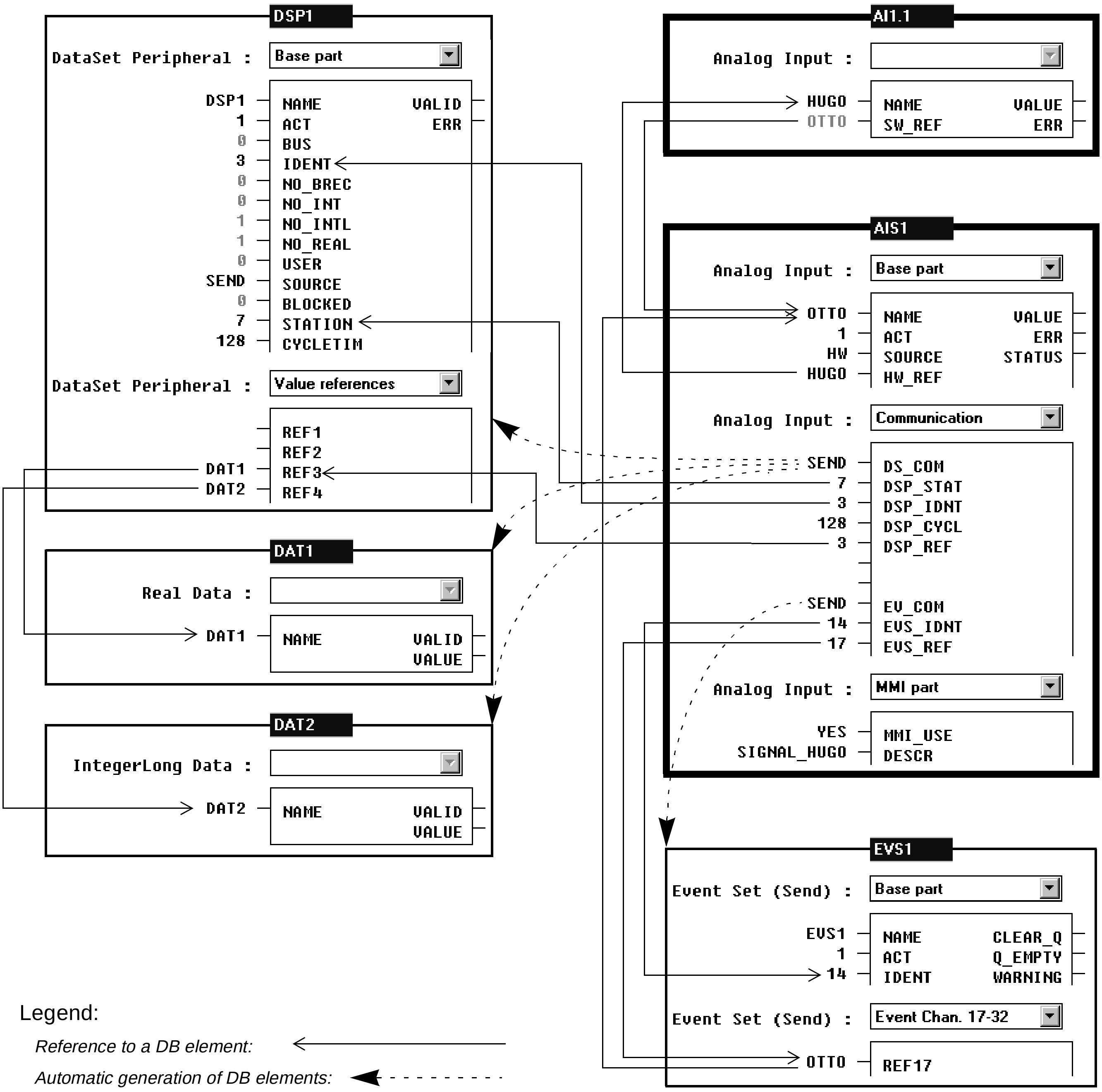


Figure 3-5. Example of AIS Data Base Element Configuration in Advant Controller 110/160

3.3.2 Configuration of COM-DIS

The configuration of a single COM-DIS PC element includes the following in Advant Controller 450 application.

Configuration rules:

General

1. Remember that there is a one-to-one relation between the DIEV data base element, and the COM-DIS PC element in Advant Controller 450 and the DIS data base element in Advant Controller 110/160.

2. **Advant Controller 450 Application**

   For each DIS object in Advant Controller 110/160 the following set of data base and PC elements is need in Advant Controller 450:

   - One COM-DIS PC element
   - One DSP data base element
   - One DAT(B) data base element (referenced by the DSP data base element). This data base element contains status and feedback values.
   - One DIEV data base element.
   - One EVS(R) data base element referencing the DIEV. Needed if alarm handling is enabled in the COM-DIS PC-element.

   a. **Data Base Element DIEV**
   Create one DIEV data base element for each DIS data base element to be handled by CQ07-COM41, as described in guidelines for integration of Advant Controller 110/160 objects with AIEV/DIEV data base elements in Advant Controller 450. See also the example in Section 3.4, Configuration Example.

   b. **PC Element COM-DIS: Call Parameters**
   Insert a COM-DIS PC element. Alarm handling is enabled by setting the call parameter C1. Value setting is enabled by setting C2. Normally cycle time for CONTRM is 1 second.

   c. **PC Element COM-DIS: TIMEOUT Terminal**
   Enter value for TIMEOUT terminal. This value controls when the COM-DIS resets the status of DIEV data base element, if a command has been given without proper feedback from DIS data base element in Advant Controller 110/160. To be able to catch all kind of error codes if something goes wrong, a TIMEOUT value of 7 (seconds) or higher is recommended.

d. **PC Element COM-DIS: Identification Terminals**
Enter values on the terminals BUS, STATION, POSITION and INSTNO for identification of a single object in Advant Controller 110/160.

BUS = BUS number of Advant Fieldbus 100 bus between Advant Controller 450 and Advant Controller 110/160 hosting DIS object.

STATION = number of wheel on back plane of the Advant Controller 110/160 hosting DIS object.

POSITION = Position number of CPU hosting application with DIS object in Advant Controller 110/160 (count from left of rack 1,2,3 ...). If CPU redundancy, then choose the lowest number.

INSTNO = The instance number of the DIS in Advant Controller 110/160. When using FCB, select FILE - Open - DB, is derived from table column 1 (DIS object name in column 2, section INSTNO). One example: DIS13 data base element in Advant Controller 110/160 imply INSTNO = 13.

e. **PC Element COM-DIS: Functional Connections**
Connect the terminals of COM-DIS PC element as shown in Figure 3-6.

NOTE

The DAT data base element terminals in Figure 3-6 must be used to get correct configuration.

f. **PC Element COM-DIS: Status and Error Terminals**
The BUSY, BUSY_STAT, ERR and ERRTYPE terminals are used for indication. If necessary these can be used (please refer to manual below).

g. **Activation of PC Program**
Start PC program (when DSP data base element has terminal VALID=1 and EVS(R) data base element has terminal WARNING=0). DIS object in Advant Controller 110/160 may now be operated by Advant Station 500 Operator Station through DIEV in Advant Controller 450

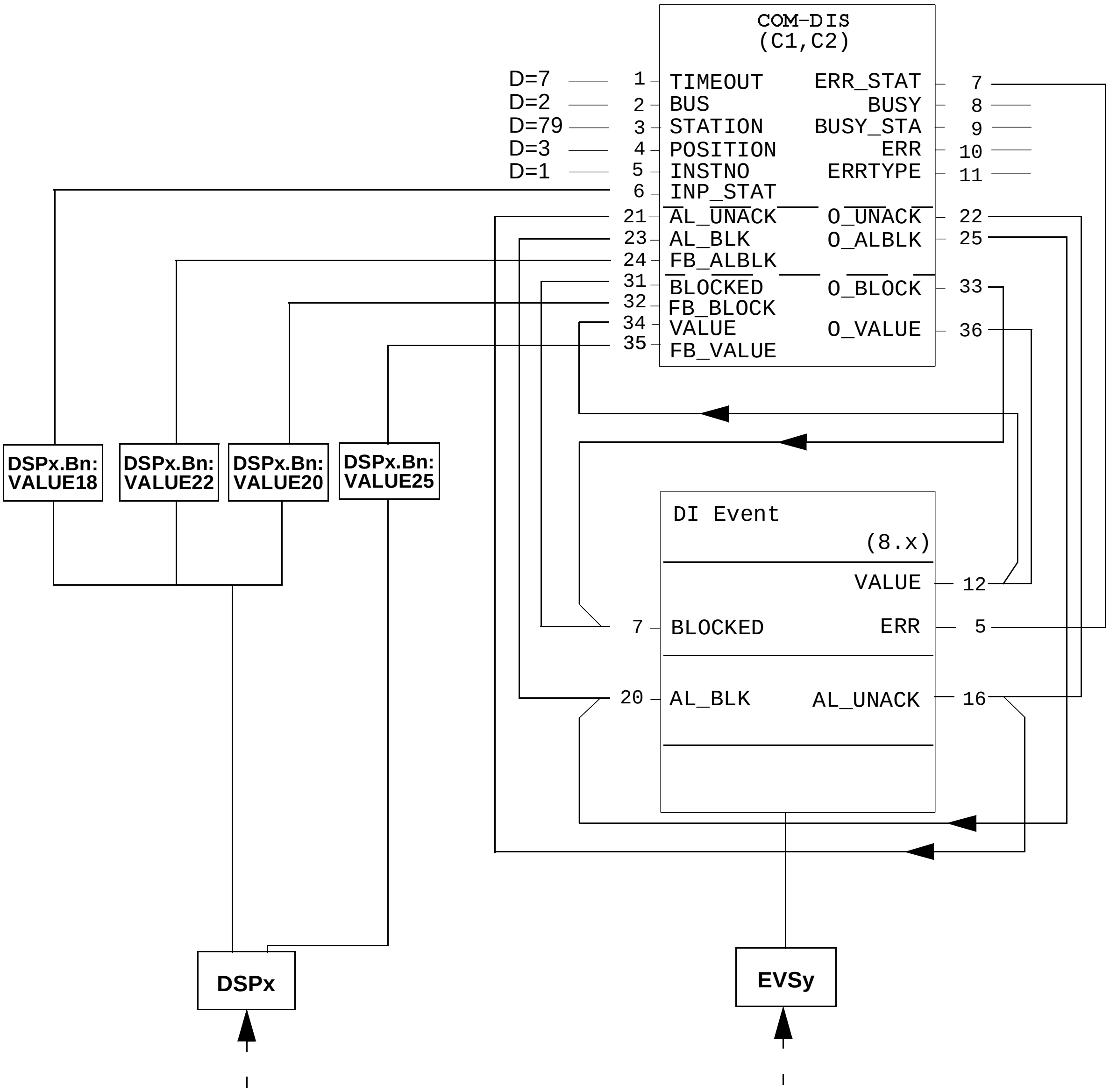


Figure 3-6. Configuration of COM-DIS (Terminal 1-5 Example Values)

3. **Advant Controller 110/Advant Controller 160 Application**

   Automatic Creation of DSP/DAT/EVS(S) Data Base Elements
   If you create a data base element, all necessary DSP, DAT, and EVS(S) data base elements are automatically created as specified by values of the DS_COM, DSP_BUS, DSP_STAT, DSP_IDNT, DSP_CYCL, DSP_REF, EV_COM, EV_SRC, EVS_IDNT, EV_REF, EV_STAT, and EV_ERR terminals. All necessary references are automatically established between the data base element and the DSP, DAT, and EVS(S) data base elements.

   DATA for status (value is part of the status) pertaining to a data base element DIS or DOS have to be referenced by one DSP data base element.

   The DAT(B) data base element for status of a DIS or DOS data base element is referenced by terminal REF*i* of a pertaining DSP data base element where *i* is defined by the terminal DSP_REF.

NOTE

You receive the status data set as a DAT(B) instead of DAT(I). This is done so you do **not** have to use a CONV-IB PC element in the application program.

The Function Chart Builder automatically creates the data base elements DSP, DAT, and EVS. These data base elements are in principle invisible for you (that is, they are not listed in the FCB together with separately created data base elements of these types). Nevertheless, be aware that they are created.

Refer to *PC Elements Advant Controller 400 Series Reference Manual* and *Data Base Elements Advant Controller 100 Series Reference Manual* for Advant Controller 110 and *Data Base Elements Advant Controller 160 Reference Manual* for Advant Controller 160.

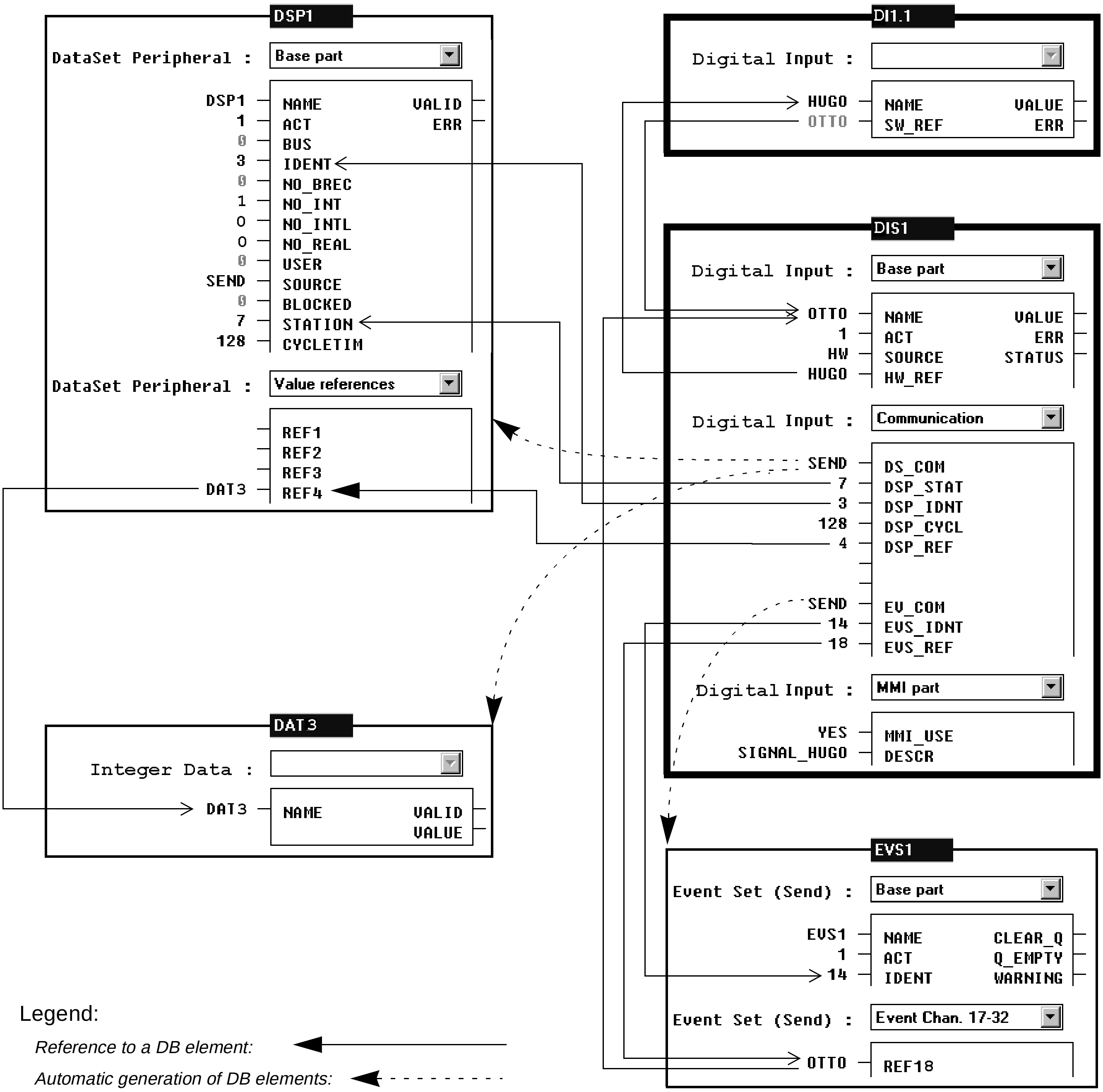


Figure 3-7. Example of DIS Data Base Element Configuration

3.3.3 Configuration of COM-M

The configuration of a single COM-M element includes the following in Advant Controller 450 application:

Configuration rules:

1. **General**

   Remember that when using a COM-M(C1,C2,C3) PC element in Advant Controller 450, there has to exists one corresponding MB or MI or MIL or MR in the Advant Controller 110/160.

2. **Advant Controller 450 Application**

   a. **PC element COM-M: Call Parameters**
   Insert a COM-M (C1, C2, C3) PC element. C1 = Number of values or command groups to be handled by the PC element (1..9). COM-M handles MI / MB / MIL / MR with these combinations respectively C2, C3 = I,0 / C2, C3 = IL,0 / C2, C3 = IL,1 / C2, C3 = R,0.

   b. **PC Element COM-M: TIMEOUT Termina**l
   Enter value for TIMEOUT terminal. This terminal value does not have any obvious effect for COM-M PC elements, but should be set to value = 7.

   c. **PC Elements COM-M: Identification Terminals**
   Enter values on the terminals BUS, STATION, POSITION and INSTNO for identification of a single object in Advant Controller 110/160.

   BUS = BUS number of Advant Fieldbus 100 bus between Advant Controller 450 and Advant Controller 110/160 hosting MI / MB / MIL / MR object.

   STATION = number of wheel on back plane of the Advant Controller 110/160 station hosting MI / MB / MIL / MR object.

   POSITION = Position number of CPU hosting application with MI / MB / MIL / MR object in Advant Controller 110/160 (count from left of rack 1,2,3 ...). If CPU redundancy is being used then use lowest number of choice.

   INSTNO = The instance number of the MI / MB / MIL /MR in Advant Controller 110/160. When using FCB, select FILE - Open Section - DB, INSTNO is derived from table column 1 (MI / MB / MIL / MR object name in column 2). One example: MIL13 in Advant Controller 110/160 imply INSTNO = 13.

   d. **PC element COM-M: Command Value**
   Enter command values on the CMD terminals enabled (a constant or a connection), see Figure 3-8.

   e. **PC Element COM-M: Command Activation**
   Connect each of the ACTCMD terminals for controlling the command send operation, see Figure 3-8.

   f. **PC Element COM-M: Status and Error Terminals**
   The BUSY, BUSY_STAT, ERR and ERRTYPE terminals are used for indication. If necessary these might be used (please refer to manual below).

g. **Activation of PC Program**
Start PC program (when DSP data base element has terminal VALID=0 and EVS(R) data base element has terminal WARNING=0). MB / MI / MIL / MR in Advant Controller 110/160 may now be operated by application in Advant Controller 450.

h. **Using More than One Command Group**
If more than one command group is going to be used for COM-M (C1, C2, C3) (C1 > 1), then remember that for each time the PC element detects a trigg on an ACTCMD terminal, this command is stored in a circular ring buffer (if full (max 10) the oldest command is overwritten). The commands are treated one after the other.

Refer to *PC Elements Advant Controller 400 Series Reference Manual*.

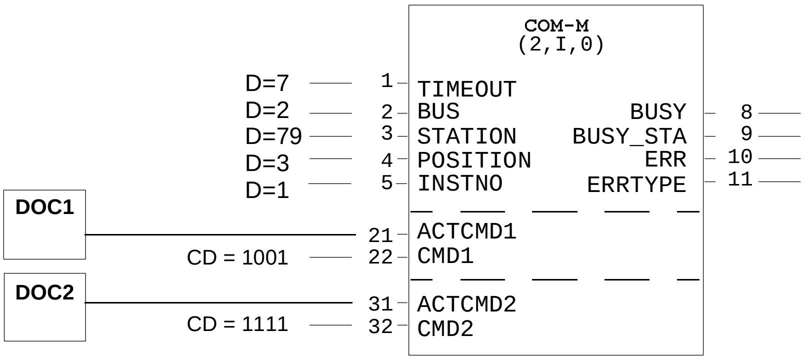


Figure 3-8. Configuration of COM-M (2, I, 0) in this Example (Terminal 1-5 Example Values)

In Figure 3-8 two DOC data base elements are used for trigging command sending from COM-M. The DOC data base element could be maneuvered from the operator station or from a application program.

COM-M PC element is able to detect and handle up to 9 commands. When the ACTCMDx terminal changes from 0 to 1 between two different executions cycles. Every time the PC element is executed it records which commands have been given compared to last execution cycle. The command with the lowest terminal number (ACTCMDx) will be recorded first of the commands detected each cycle. This "memory" of the COM-M PC element **can only contain 10 commands (the oldest command will be overwritten in a circular buffer manner if even more commands are activated at the same time)**. The application designer must assure that not more than 10 pending commands are given to the COM-M PC element. Normally the design should never allow more than 3-4 commands to be activated in the COM-M PC element before some sort of confirmation signal (feedback) have been received from the application in the Advant Controller 110/160.

As soon as at least one command is detected, the COM-M PC element starts to handle this command, and sends a message to Advant Controller 110/160. This handling (BUSY=1) will normally be over in the next execution cycle of the PC element, and the next command, if any left in the memory, will then be handled.

3.4 Configuration Example

The example includes minimal configurations of data bases and application program needed to control one AIS object, one DIS object and one MB object in Advant Controller 110/160, from an operator station connected to an Advant Controller 450.

It is assumed that the controllers include a certain hardware configuration, such as CI522 and CI626 for Advant Fieldbus 100 communication, and that the hardware modules are inserted at specific positions in respective controller. See respective data base source code listings in the appendix for more details. The example configuration can of cause be changed to match other preferred configuration alternatives.

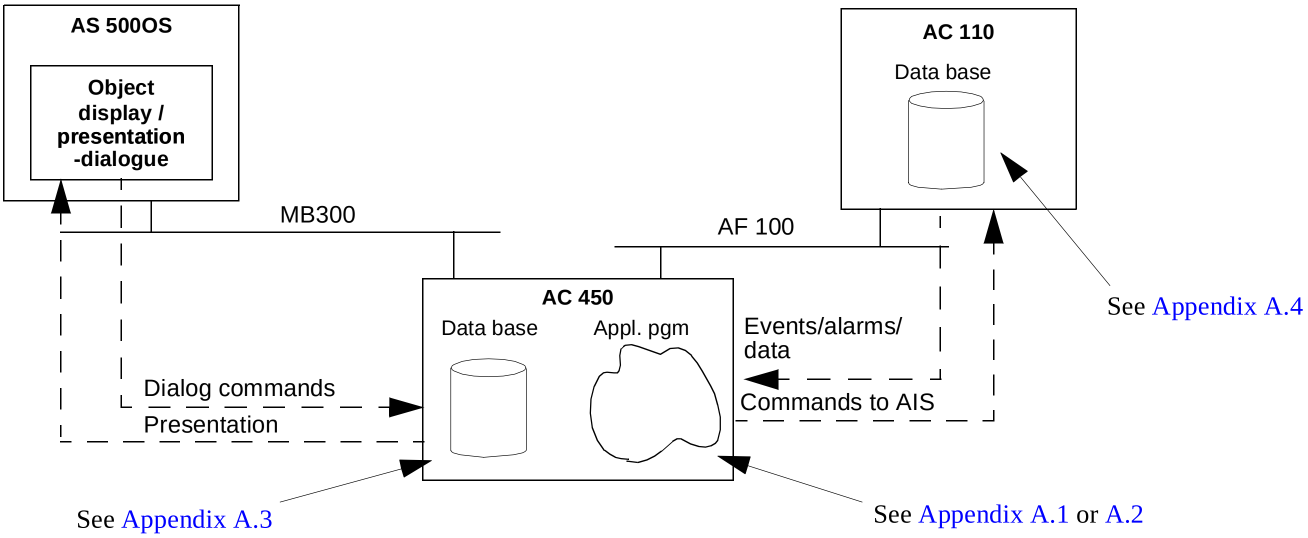


Figure 3-9. Example of Configuration Overview

Appendix A.1 includes graphical examples of PC elements needed in the Advant Controller 450.

Appendix A.2 includes a PC element source code listing for the Advant Controller 450.

Appendix A.3 includes a DB element source code listing for the Advant Controller 450.

Appendix A.4 includes a DB element source code listing for the Advant Controller 110.

Chapter 4 Runtime Operation

4.1 Operating Overview

The program module QC07-COM41 enables AIS and DIS objects in Advant Controller 110/160 to be operated from the Operator Station connected to Advant Controller 450. The operators view is an Analog Input respectively a Digital Input object. The objects can be operated with respect to acknowledgment of alarms, blocking of events and alarms, blocking of process data update and to setting a process data value.

The Advant Controller 450 “Object Support via Advant Fieldbus 100” function together with the application program provide for the source object in Advant Controller 110/160 to be updated accordingly and vice versa.

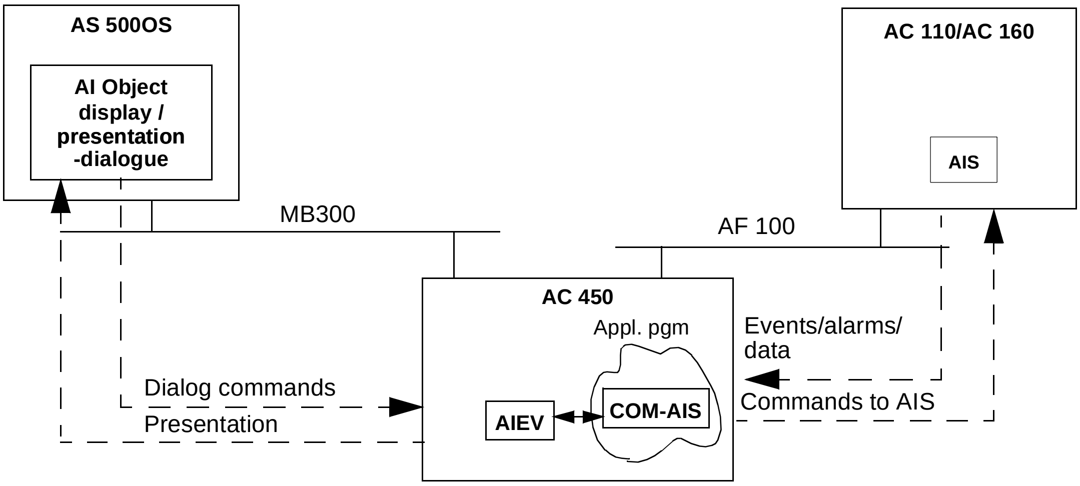


Figure 4-1. Overview of Analog Input Object Support in Advant OCS

The Advant Controller 110/160 MB, MI, MIL, MR objects can be handled via the COM-M PC element in Advant Controller 450. To operate these objects from an Operator Station it is necessary to build some application program logic in the Advant Controller 450 including an object that the Operator Station supports. The COM-M PC element is then used to handle the communication towards the Advant Controller 110/160.

4.1.1 Description of COM-AIS/COM-DIS Acknowledge of Alarm

When an alarm is issued from an AIS/DIS object in Advant Controller 110/Advant Controller 160, the AL_UNACK terminal of that object goes high to indicate that the object has an unacknowledged alarm. The alarm is sent as an EVS event to the mirrored AIEV/DIEV object in AC450. The AL_UNACK terminal of the AIEV/DIEV object will then go high.

The AL_UNACK terminal of the AIEV/DIEV object is connected to the AL_UNACK terminal on the COM-AIS/COM-DIS PC element. At the next execution cycle of the COM-AIS/COM-DIS PC element, all the input terminals will be read. The PC element will then set its output terminal O_UNACK to high so that it has the same value as the AL_UNACK terminal on the AIEV/DIEV object. No command will be given to the AIS/DIS object in Advant Controller 110/Advant Controller 160 at this point.

The operator at the Advant Station 500 Operator Station will see the alarm, which is not specific for the COM-AIS/COM-DIS handling. When the operator acknowledges an alarm, the AL_UNACK terminal of the AIEV/DIEV object goes low. When the PC element executes next, it will trace a level change on its AL_UNACK terminal.

At this point COM-AIS/COM-DIS functionality has traced that an acknowledge alarm action has occurred. The PC element sends a command through the AF100 bus towards the corresponding object in Advant Controller 110/Advant Controller 160. The PC element sets its BUSY flag high to indicate that a command is pending. The O_UNACK terminal is set to a low value (reflecting the AL_UNACK value) and the operator will at this point see that the command is acknowledged.

After some time the alarm acknowledge command is caught by the AIS/DIS object in Advant Controller 110/Advant Controller 160.

Next time the PC element executes, it will set the BUSY flag low if there has been an answer that the operation has been fulfilled.

Now the alarm is acknowledged in the AIS/DIS object and the result is synchronized in the mirrored AIEV/DIEV and COM-AIS/COM-DIS object in Advant Controller 450.

The Advant Station 500 Operator Station will through the order channels receive a message from the AIEV/DIEV object about the successful acknowledgment performed.

A feedback message will be given back to Advant Station 500 Operator Station after an acknowledge of an object in Advant Controller 110/Advant Controller 160 has been performed. The condition is that the EVS arrangement is functioning and that the connections between AIEV/DIEV data base elements and COM-AIS/COM-DIS PC elements is correct.

4.1.2 Description of COM-AIS/COM-DIS Command Sending

There are three different commands to be sent from Advant Station 500 Operator Station towards an AIS/DIS object in Advant Controller 110/Advant Controller 160; ALARM_BLOCK, UPDATE_BLOCK and SET_VALUE.
The SET_VALUE command will only work on an object that is already blocked (that is UPDATE_BLOCK command must be issued first).

When a command is sent from an Advant Station 500 Operator Station, it will be caught first by an AIEV/DIEV object in Advant Controller 450. The corresponding output terminal is then updated with the new value.

When the COM-AIS/COM-DIS executes at next cycle, the input terminals will be read and the type of command will be verified. A command will be constructed and sent through the Advant Fieldbus 100 towards the AIS/DIS object in Advant Controller 110/Advant Controller 160. The PC element sets its BUSY flag to true, indicating a pending command execution. The output value will be updated so it has the same value as the newly changed input value.

Next the command will be fetched by the AIS/DIS object in Advant Controller 110/Advant Controller 160 which will set the correct value on the indicated terminal. This value will be transferred via DSP data base element, from the DAT object in Advant Controller 110/160 to a VALUE terminal on an DAT object in Advant Controller 450.

When the PC element COM-AIS/COM-DIS executes next, it will read the value from the connected DAT object for command verification. The BUSY flag is brought low to indicate that the command is finished. The output terminal value will finally be read by the AIEV/DIEV object.

4.1.3 Description of COM-M Functionality

An arrangement containing a PC element called COM-M, which could be included in a Functional Unit, shall give the functionality as a mirrored MB/MI/MIL/MR object, which does not exist in Advant Controller 450.

A mechanism to control the execution of the COM-M PC element is provided. When executed, a value (I/B/IL/R) is sent to the MI/MB/MIL/MR element in Advant Controller 110/Advant Controller 160.

The COM-M element handles up to 9 command groups. In each command group there exists one activation terminal called ACTCMD and one value terminal called CMD. When the ACTCMD is raised to a high value, the CMD value is sent to an object in the Advant Controller 110/Advant Controller 160.

The changes on the ACTCMD terminals is buffered, so the activation of the commands can be performed at consecutive execution cycles. Only one command may be issued within one execution cycle. The command groups are prioritized by the group number (call parameter C1). The C2 call parameter denotes the data type of the CMD terminals (I/IL/R). If C2 = IL, a third call parameter C3 is used to decide if commands should be issued towards MB or MIL objects (both take 32 bit long integer value).

To load MB/MI/MIL/MR values, a standard data base element (DSP) could be connected, to the Functional Unit if this is used, or to the COM-M PC element.

4.2 Operating Instructions

To be able to fully maneuver an object in Advant Controller 110/160 the following must be fulfilled:

- The application part (data base and PC programs) in Advant Controller 450 must be configured and running.
- The Advant Fieldbus 100 must be configured and running.
- The Advant Controller 110/160 objects must be configured and running.
- DSP data base element must have terminal VALID=1 and EVS data base element must have terminal WARNING=0 before expecting a successful operation of the COM-AIS/COM-DIS PC elements.

Remember that if the AIS or DIS object in Advant Controller 110/160 does not respond successfully to a command, then COM-AIS/COM-DIS will reset status on the Advant Station 500 Operator Station. In this situation the Advant Station 500 Operator Station does not update its presentation fully, so the operator has to bring up the dialog presentation once more to refresh the presentation.

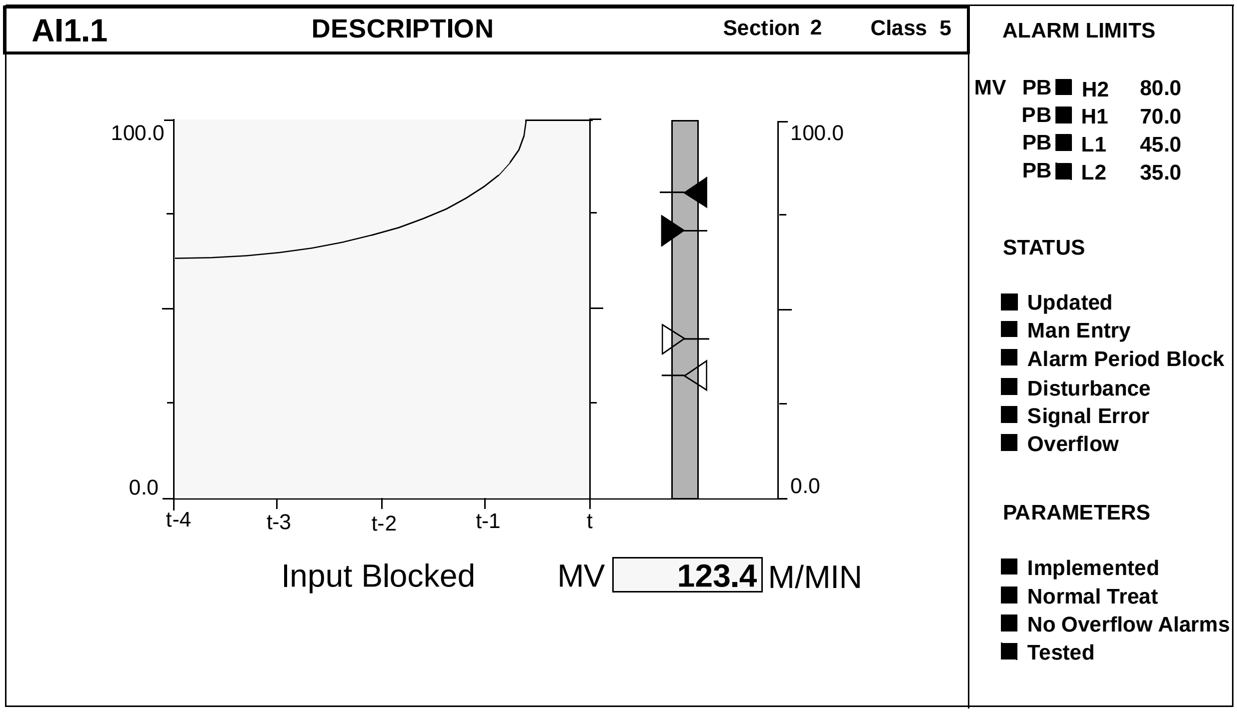
NOTE

Delayed alarm function is **not** available for AIEV and DIEV objects.

The alarm limits of the AIEV should normally **not** be altered from the operator station. They should be configured in the Advant Controller 450 to match the configuration of the AIS object in the Advant Controller 110/160.

When this is fulfilled can the object be handled as an ordinary (Analog Input or Digital Input) object in Advant Controller 450, see Figure 4-2 for an example of an Analog Input object display.

Object Display: AIOB01



AI1.1 **DESCRIPTION** **Section 2** **Class 5**

Input Blocked MV 123.4 M/MIN

ALARM LIMITS

MV	**PB**	■	**H2**	**80.0**
	PB	■	**H1**	**70.0**
	PB	■	**L1**	**45.0**
	PB	■	**L2**	**35.0**

STATUS

- ■ **Updated**
- ■ **Man Entry**
- ■ **Alarm Period Block**
- ■ **Disturbance**
- ■ **Signal Error**
- ■ **Overflow**

PARAMETERS

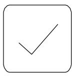
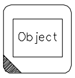
- ■ **Implemented**
- ■ **Normal Treat**
- ■ **No Overflow Alarms**
- ■ **Tested**

Figure 4-2. Analog Input Object Display

Refer to *Functional Units Part 2 AI AO DI DO User's Guide* for further information.

MAX Dialog (Authority Key)

Keyboard Keys

	**Acknowledge**	Acknowledge alarm
	Object Trend	Select Object Trend
	**Object Display**	Select Object Display
	Previous Level	Select Top Level dynamic keys
	Next Block	Page between the dynamic key sets (Keyboard and Limits)

Dynamic Keys, Top Level

D1 Block Input	D2 Block Alarm	D3 Block Printout	D4	D5 *Limits...*
D6 Deblock Input	D7 Deblock Alarm	D8 Deblock Printout	D9	D10 *Keyboard...*

Block Input	Block data base input
Block Alarm	Block alarm indication and event handling from signal
Block Printout	Block event printout from signal
Limits...	Select Dynamic keys: Limits
Deblock Input	Deblock data base input
Deblock Alarm	Deblock alarm indication and event handling from signal
Deblock Printout	Deblock event printout from signal
Keyboard...	Select Dynamic keys: Keyboard

Chapter 5 Maintenance

5.1 Error Messages

See *PC Elements Advant Controller 400 Series Reference Manual*.

Appendix A Application Example

A.1 Advant Controller 450 PC Elements

Below follows extract of graphical examples of PC elements needed in the Advant Controller 450.

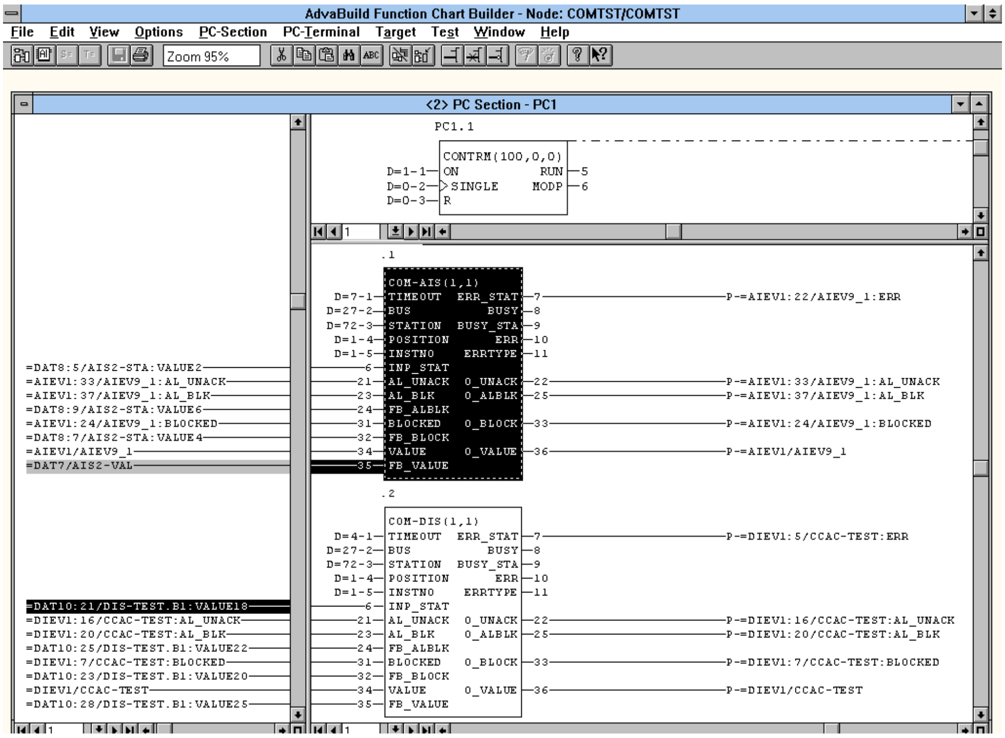

AdvaBuild Function Chart Builder - Node: COMTST/COMTST
File Edit View Options PC-Section PC-Terminal Target Test Window Help
Zoom 95%
<2> PC Section - PC1
PC1.1
CONTRM(100,0,0)
D=1-1 ON RUN 5
D=0-2 SINGLE MODP 6
D=0-3 R
.1
COM-AIS(1,1)
D=7-1 TIMEOUT ERR_STAT 7 P-=AIEV1:22/AIEV9_1:ERR
D=27-2 BUS BUSY 8
D=72-3 STATION BUSY_STA 9
D=1-4 POSITION ERR 10
D=1-5 INSTNO ERRTYPE 11
=DAT8:5/AIS2-STA:VALUE2 6 INP_STAT
=AIEV1:33/AIEV9_1:AL_UNACK 21 AL_UNACK O_UNACK 22 P-=AIEV1:33/AIEV9_1:AL_UNACK
=AIEV1:37/AIEV9_1:AL_BLK 23 AL_BLK O_ALBLK 25 P-=AIEV1:37/AIEV9_1:AL_BLK
=DAT8:9/AIS2-STA:VALUE6 24 FB_ALBLK
=AIEV1:24/AIEV9_1:BLOCKED 31 BLOCKED O_BLOCK 33 P-=AIEV1:24/AIEV9_1:BLOCKED
=DAT8:7/AIS2-STA:VALUE4 32 FB_BLOCK
=AIEV1/AIEV9_1 34 VALUE O_VALUE 36 P-=AIEV1/AIEV9_1
=DAT7/AIS2-VAL 35 FB_VALUE
.2
COM-DIS(1,1)
D=4-1 TIMEOUT ERR_STAT 7 P-=DIEV1:5/CCAC-TEST:ERR
D=27-2 BUS BUSY 8
D=72-3 STATION BUSY_STA 9
D=1-4 POSITION ERR 10
D=1-5 INSTNO ERRTYPE 11
=DAT10:21/DIS-TEST.B1:VALUE18 6 INP_STAT
=DIEV1:16/CCAC-TEST:AL_UNACK 21 AL_UNACK O_UNACK 22 P-=DIEV1:16/CCAC-TEST:AL_UNACK
=DIEV1:20/CCAC-TEST:AL_BLK 23 AL_BLK O_ALBLK 25 P-=DIEV1:20/CCAC-TEST:AL_BLK
=DAT10:25/DIS-TEST.B1:VALUE22 24 FB_ALBLK
=DIEV1:7/CCAC-TEST:BLOCKED 31 BLOCKED O_BLOCK 33 P-=DIEV1:7/CCAC-TEST:BLOCKED
=DAT10:23/DIS-TEST.B1:VALUE20 32 FB_BLOCK
=DIEV1/CCAC-TEST 34 VALUE O_VALUE 36 P-=DIEV1/CCAC-TEST
=DAT10:28/DIS-TEST.B1:VALUE25 35 FB_VALUE

Figure A-1. AC 450 - PC1.1 ... PC1.1.2

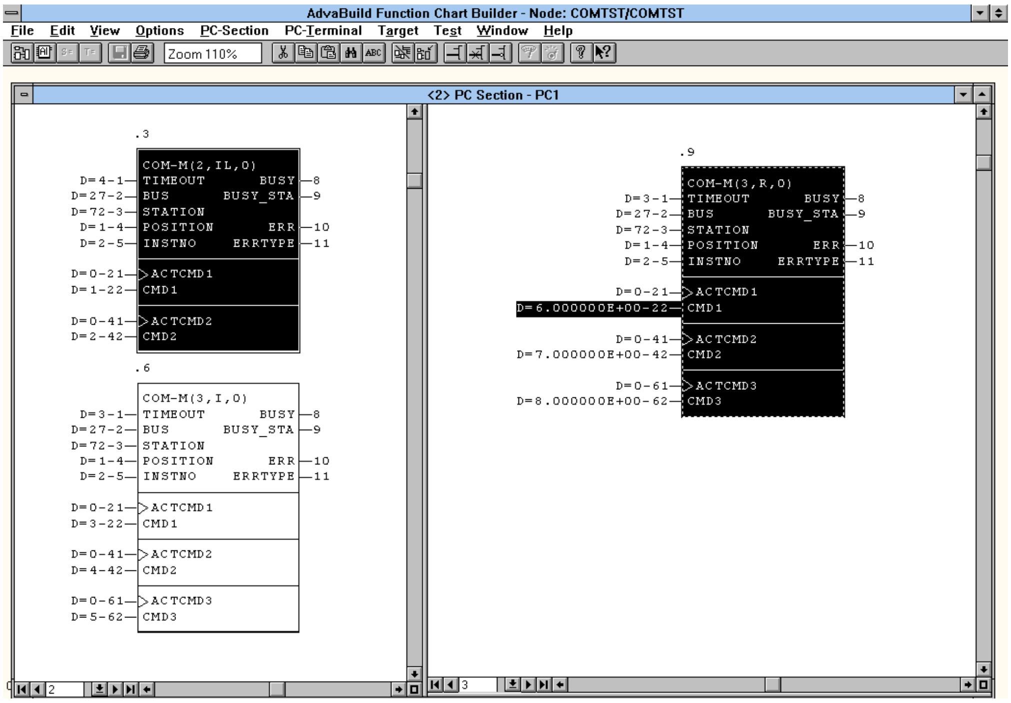
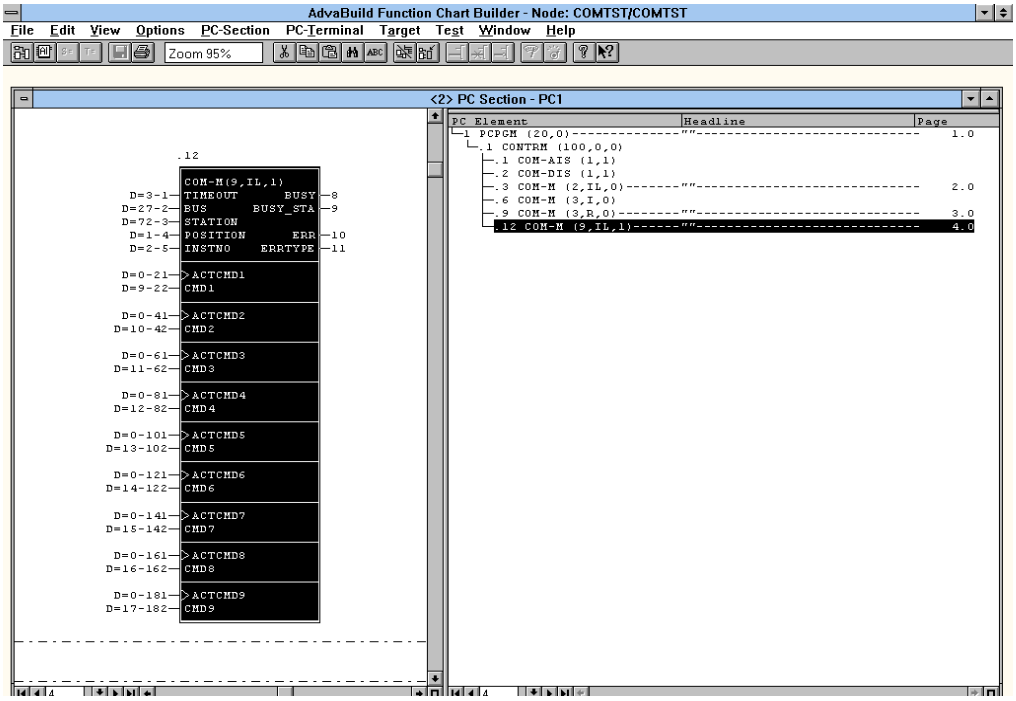


Figure A-2. AC 450 - PC1.1.3 ... PC1.1.9



```
PC Element                         Headline                          Page
└─1 PCPGM (20,0)---------------""-----------------------------        1.0
  └─.1 CONTRM (100,0,0)
     ├─.1 COM-AIS (1,1)
     ├─.2 COM-DIS (1,1)
     ├─.3 COM-M (2,IL,0)--------""-----------------------------        2.0
     ├─.6 COM-M (3,I,0)
     ├─.9 COM-M (3,R,0)---------""-----------------------------        3.0
     └─.12 COM-M (9,IL,1)-------""-----------------------------        4.0
```

Figure A-3. AC 450 - PC1.1.12

A.2 Advant Controller 450 PC Element Source Code Listing

Below follows extract of PC element source code listing for the Advant Controller 450. Please, **note** that the ACTCMDx terminals for the COM-M PC element should be replaced with a relevant trigging connection.

```
BEGIN PC1
HEADER
   Design_ch                          NAME/DEPT
   Tech_ref                           XXX
   Resp_dept                          XXX
   Date                               SEP 1997
   L_Text2                            COM41-test AC450
   Language                           E

 PCD-PAGE 1
 PC1 PCPGM (20,1)
  :ON                                 D=1
  :RUN                                D=0

 PC1.1 CONTRM (100,1,0)
  :ON                                 D=1
  :SINGLE                             D=0
  :R                                  D=0
  :RUN
  :MODP

 PC.1.1.1 COM_AIS (1,1)
  :TIMEOUT                            D=7
  :BUS                                D=27
  :STATION                            D=72
  :POSITION                           D=1
  :INSTNO                             D=1
  :INP_STAT                           =AIS2-STA:VALUE2
 :ERR_STAT                            =AIEV9_1:ERR
  :BUSY
  :BUSY_STA
  :ERR
  :ERRTYPE
  :AL_UNACK                           =AIEV9_1:AL_UNACK
  :O_UNACK                            =AIEV9_1:AL_UNACK
  :AL_BLK                             =AIEV9_1:AL_BLK
  :FB_ALBLK                           =AIS2-STA:VALUE6
  :O_ALBLK                            =AIEV9_1:AL_BLK
  :BLOCKED                            =AIEV9_1:BLOCKED
  :FB_BLOCK                           =AIS2-STA:VALUE4
  :O_BLOCK                            =AIEV9_1:BLOCKED
  :VALUE                              =AIEV9_1
  :FB_VALUE                           =AIS2-VAL
  :O-VALUE                            =AIEV9_1
```

```
PC1.1.2 COM-DIS (1,1)
 :TIMEOUT                 D=4
 :BUS                     D=27
 :STATION                 D=72
 :POSITION                D=1
 :INSTNO                  D=1
 :INP_STAT                =DIS-TEST.B1:VALUE18
 :ERR_STAT
 :BUSY
 :BUSY_STA
 :ERR
 :ERRTYPE
 :AL_UNACK                =CCAC-TEST:AL_UNACK
 :O_UNACK                 =CCAC-TEST:AL_UNACK
 :AL_BLK                  =CCAC-TEST:AL_BLK
 :FB_ALBLK                =DIS-TEST.B1:VALUE22
 :O_ALBLK                 =CCAC-TEST:AL_BLK
 :BLOCKED                 =CCAC-TEST:BLOCKED
 :FB_BLOCK                =DIS-TEST.B1:VALUE20
 :O_BLOCK                 =CCAC-TEST:BLOCKED
 :VALUE                   =CCAC-TEST
 :FB_VALUE                =DIS-TEST.B1:VALUE25
 :O_VALUE                 =CCAC-TEST

PCD-PAGE 2
PC.1.1.3 COM_M (2,IL,0)
 :TIMEOUT                 D=4
 :BUS                     D=27
 :STATION                 D=72
 :POSITION                D=1
 :INSTNO                  D=2
 :BUSY
 :BUSY_STA
 :ERR
 :ERRTYPE
 :ACTCMD1                 D=0
 :CMD1                    D=1
 :ACTCMD2                 D=1
 :CMD2                    D=2

PC.1.1.6 COM_M (3,I,0)
 :TIMEOUT                 D=3
 :BUS                     D=27
 :STATION                 D=72
 :POSITION                D=1
 :INSTNO                  D=2
 :BUSY
 :BUSY_STA
 :ERR
 :ERRTYPE
 :ACTCMD1                 D=0
 :CMD1                    D=3
 :ACTCMD2                 D=0
 :CMD2                    D=4
 :ACTCMD3                 D=0
 :CMD3                    D=5
```

```
PCD-PAGE 3
PC.1.1.9 COM_M (3,R,0)
 :TIMEOUT                 D=3
 :BUS                     D=27
 :STATION                 D=72
 :POSITION                D=1
 :INSTNO                  D=2
 :BUSY
 :BUSY_STA
 :ERR
 :ERRTYPE
 :ACTCMD1                 D=0
 :CMD1                    D=6.000000E+00
 :ACTCMD2                 D=0
 :CMD2                    D=7.000000E+00
 :ACTCMD3                 D=0
 :CMD3                    D=8.000000E+00

PC.1.1.12 COM_M (9, IL,1)
 :TIMEOUT                 D=3
 :BUS                     D=27
 :STATION                 D=72
 :POSITION                D=1
 :INSTNO                  D=2
 :BUSY
 :BUSY_STA
 :ERR
 :ERRTYPE
 :ACTCMD1                 D=0
 :CMD1                    D=9
 :ACTCMD2                 D=0
 :CMD2                    D=10
 :ACTCMD3                 D=0
 :CMD3                    D=11
 :ACTCMD4                 D=0
 :CMD4                    D=12
 :ACTCMD5                 D=0
 :CMD5                    D=13
 :ACTCMD6                 D=0
 :CMD6                    D=14
 :ACTCMD7                 D=0
 :CMD7                    D=15
 :ACTCMD8                 D=0
 :CMD8                    D=16
 :ACTCMD9                 D=0
 :CMD9                    D=17

END PC1
```

A.3 Advant Controller 450 DB Element Source Code Listing

Below follows extract from a data base code source code for Advant Controller 450.

```
DEFAULT CI522
 :BUS                        0
 :STATION                    0
 :SERVICE                    1
 :TYPE                       CI522
 :BUSNO                      0
 :STNNO                      1
 :MASTER                     1
 :TIMESYNC                   1
 :CABLE                      R
 :EN_DTMO                    YES
 :CH_OVER                    NO
 :POS_I                      0
 :SPOS_I                     0
 :POS_II                     0
 :SPOS_II                    0
 :IMPL                       1

AF100_1                      CI522
 :NAME                       AF100_1
 :BUSNO                      27
 :STNNO                      3
 :POS_I                      3
 :SPOS_I                     1
 :POS_II                     7
 :SPOS_II                    1

DEFAULT AC110
 :BUS                        0
 :STATION                    0
 :TYPE                       AC110
 :DESCR
 :IMPL                       1

AC110_1                      AC110
 :NAME                       AC110_1
 :BUS                        27
 :STATION                    72
 :DESCR                      Node 72
```

```
DEFAULT AIEV
 :BLOCKED                 0
 :UNIT                    %
 :TESTED                  0
 :EN_H2                   1
 :HI_LIM2                 0.000000
 :EN_H1                   1
 :HI_LIM1                 0.000000
 :EN_L1                   1
 :LO_LIM1                 0.000000
 :EN_L2                   1
 :LO_LIM2                 0.000000
 :DESCR
 :DISPMAX                 0.000000
 :DISPMIN                 0.000000
 :DEC                     2
 :AL_DELAY                0
 :PROC_SEC                0
 :CLASS                   0
 :H2_R_FCL                0
 :H1_R_FCL                0
 :L1_R_FCL                0
 :L2_R_FCL                0
 :AL_BLK                  0
 :PR_BLK                  0
 :ERR_TR                  0
 :LIM_1_TR                1
 :LIM_2_TR                1
 :ACT                     1

AIEV1                     AIEV
 :NAME                    AIEV9_1
 :HI_LIM2                 8.000000E+01
 :HI_LIM1                 6.000000E+01
 :LO_LIM1                 4.000000E+01
 :LO_LIM2                 2..000000E+01
 :DESCR                   Node 72 via AF 100
 :DISPMAX                 1.000000E+02
 :LIM_2_TR                2

DEFAULT DIEV
 :BLOCKED                 0
 :TESTED                  0
 :DESCR
 :AL_DELAY                0
 :PROC_SEC                0
 :CLASS                   0
 :NORM_POS                0
 :RP_F_CTL                1
 :AL_BLK                  0
 :PR_BLK                  0
 :ERR_TR                  0
 :VALUE_TR                1
 :ACT                     1
```

DIEV1	**DIEV**
:NAME	CCAC-TEST
:DESCR	COM-DIS TEST
:VALUE_TR	2

DEFAULT EVS(R)	
:IDENT	0
:QUEUE	NORMAL
:S_USER	AF 100
:S_BUS	27
:S_STN	72
:S_POS	1
:S_IDENT	5
:REF1	
:REF2	
:REF3	
:REF4	
:REF5	
:REF6	
:REF7	
:REF8	
:REF9	
:REF10	
:REF11	
:REF12	
:REF13	
:REF14	
:REF15	
:REF16	
:REF17	
:REF18	
:REF19	
:REF20	
:REF21	
:REF22	
:REF23	
:REF24	
:REF25	
:REF26	
:REF27	
:REF28	
:REF29	
:REF30	
:REF31	
:REF32	
:ACT	1

```
EVS2                       EVS(R)
 :NAME                     EVS_2
 :S_BUS                    27
 :S_STN                    72
 :S_IDENT                  5
 :REF1                     AIEV9_1
 :REF2                     CCAC-TEST

DEFAULT DSP
 :IDENT                    0
 :NO_BREC                  0
 :NO_INT                   0
 :NO_INTL                  0
 :NO_REAL                  0
 :USER                     0
 :SOURCE                   RECEIVE
 :BLOCKED                  0
 :BUS                      1
 :STATION                  0
 :CYCLETIM                 512
 :SORT_REF                 YES
 :REF1
 :REF2
 :REF3
 :REF4
 :REF5
 :REF6
 :REF7
 :REF8
 :ACT                      1

DSP2                       DSP
 :NAME                     AIS-TEST
 :IDENT                    21
 :NO_BREV                  1
 :NO_REAL                  1
 :BUS                      27
 :STATION                  72
 :CYCLETIM                 2048
 :SORT_REF                 NO
 :REF1                     AIS2-VAL
 :REF2                     AIS2-STA

DSP3                       DSP
 :NAME                     DIS-TEST
 :IDENT                    22
 :NO_BREV                  1
 :BUS                      27
 :STATION                  72
 :SORT_REF                 NO
 :REF1                     DIS-TEST.B1
```

```
DEFAULT DAT(B)
DAT8                               DAT(B)
 :NAME                             AIS2-STA
DAT10                              DAT(B)
 :NAME                             DIS-TEST.B1

DEFAULT DAT(R)
DAT7                               DAT(R)
 :NAME                             AIS2-VAL
```

A.4 Advant Controller 110 DB Element Source Code Listing

Below follows extract of data base element for the Advant Controller 110. Please, **note** that the data base elements EVS(S) and DSP are indirectly created by the AIS and DIS objects.

```
DEFAULT PM632
 :NAME
 :BUS               0
 :STATION           0
 :POSITION          1
 :IMPL              1
 :TYPE              PM632
 :WITH_BAT          1
 :CH2

PM1                 PM632
 :NAME              PM1
 :WITH_BAT          0

DEFAULT CI626
 :NAME
 :BUS               0
 :STATION           0
 :POSITION          2
 :IMPL              1
 :TYPE              CI626
 :MASTER            1
 :TIMESYNC          NONE
 :CABLE             1
 :BUSNO             0
 :STNNO             1
```

```
CI1                 CI626
 :NAME              CI1
 :TIMESYNC          SLAVE
 :BUSNO             27
 :STNNO             72

DEFAULT AIS
 :NAME
 :ACT               1
 :SOURCE            PC
 :HW_REF
 :SCANT             640ms
 :UNIT              %
 :RANGEMAX          100.000
 :RANGEMIN          0.0
 :INITVAL           0.0
 :INITENH2          1
 :HI_LIM2           90.000
 :INITENH1          1
 :HI_LIM1           80.000
 :INITENL1          1
 :LO_LIM1           20.000
 :INITENL2          1
 :LO_LIM2           10.000
 :HYST              1.000000E+00
 :DS_COM            NONE
 :DSP_BUS           0
 :DSP_STAT          1
 :DSP_IDNT          1
 :DSP_CYCL          1024
 :DSP_REF           1
 :EV_COM            NONE
 :EVS_IDNT          1
 :EVS_REF           1
 :EV_STAT           YES
 :EV_ERR            YES
 :MMI_USE           NO
 :DESCR
 :DISPMAX           100.000
 :DISPMIN           0.0
 :DEC               2
 :PROC_SEC          0
 :CLASS             0
 :LIM_1_TR          0
 :LIM_2_TR          0
 :ERR_TR            0
 :HW_PCDIA          NO
 :LIM_SRC           SW
 :SCALING           CONTROLLER
 :SCAL_MAX          100.000
 :SCAL_MIN          0.0
```

AIS1	**AIS**
:NAME	AIS1
:HI_LIM2	80.000
:HI_LIM1	60.000
:LO_LIM1	40.000
:LO_LIM2	20.000
:DS_COM	SEND
:DSP_BUS	27
:DSP_STAT	72
:DSP_IDNT	21
:EV_COM	SEND
:EVS_IDNT	5
:LIM_2_TR	2

DEFAULT DIS	
:NAME	
:ACT	1
:SOURCE	PC
:HW_REF	
:SCANT	640ms
:FILT_FTR	0
:INITVAL	0
:DS_COM	NONE
:DSP_BUS	0
:DSP_STAT	1
:DSP_IDNT	1
:DSP_CYCL	1024
:DSP_REF	1
:EV_COM	NONE
:EV_SRC	SW
:EVS_IDNT	1
:EVS_REF	1
:EV_STAT	YES
:EV_ERR	YES
:MMI_USE	NO
:DESCR	
:PROC_SEC	0
:CLASS	0
:ERR_TR	0
:VALUE_TR	0
:NORM_POS	0
:HW_PCDIA	NO

DIS1	**DIS**
:NAME	DIS1
:DS_COM	SEND
:DSP_BUS	27
:DSP_STAT	72
:DSP_IDNT	22
:EV_COM	SEND
:EVS_IDNT	5
:EVS_REF	2
:VALUE_TR	2

```
DEFAULT MB
 :NAME
 :ACT                1
 :SOURCE             PC
 :SCANT              640ms
 :DS_COM             NONE
 :DSP_BUS            0
 :DSP_STAT           1
 :DSP_IDNT           1
 :DSP_CYCL           1024
 :DSP_REF            1
 :EV_COM             NONE
 :EVS_IDNT           1
 :EVS_REF            1
 :MMI_USE            NO
 :DESCR

MB2                  MB
 :NAME               MB2
 :SOURCE             MMI
MB2.1
 :NAME               MB2.1
MB2.2
 :NAME               MB2.2
MB2.3
 :NAME               MB2.3
MB2.4
 :NAME               MB2.4
MB2.5
 :NAME               MB2.5
MB2.6
 :NAME               MB2.6
MB2.7
 :NAME               MB2.7
MB2.8
 :NAME               MB2.8
MB2.9
 :NAME               MB2.9
MB2.10
 :NAME               MB2.10
MB2.11
 :NAME               MB2.11
MB2.12
 :NAME               MB2.12
MB2.13
 :NAME               MB2.13
MB2.14
 :NAME               MB2.14
MB2.15
 :NAME               MB2.15
MB2.16
 :NAME               MB2.16
```

MB2.17	
:NAME	MB2.17
MB2.18	
:NAME	MB2.18
MB2.19	
:NAME	MB2.19
MB2.20	
:NAME	MB2.20
MB2.21	
:NAME	MB2.21
MB2.22	
:NAME	MB2.22
MB2.23	
:NAME	MB2.23
MB2.24	
:NAME	MB2.24
MB2.25	
:NAME	MB2.25
MB2.26	
:NAME	MB2.26
MB2.27	
:NAME	MB2.27
MB2.28	
:NAME	MB2.28
MB2.29	
:NAME	MB2.29
MB2.30	
:NAME	MB2.30
MB2.31	
:NAME	MB2.31
MB2.32	
:NAME	MB2.32

DEFAULT MI	
:NAME	
:ACT	1
:SOURCE	PC
:SCANT	640ms
:UNIT	%
:INITVAL	0
:DS_COM	NONE
:DSP_BUS	0
:DSP_STAT	1
:DSP_IDNT	1
:DSP_CYCL	1024
:DSP_REF	1
:MMI_USE	NO
:DESCR	

MI2	**MI**
:NAME	MI2
:SOURCE	MMI

```
DEFAULT MIL
 :NAME
 :ACT              1
 :SOURCE           PC
 :SCANT            640ms
 :UNIT             %
 :INITVAL          0
 :DS_COM           NONE
 :DSP_BUS          0
 :DSP_STAT         1
 :DSP_IDNT         1
 :DSP_CYCL         1024
 :DSP_REF          1
 :MMI_USE          NO
 :DESCR

MIL2               MIL
 :NAME             MIL2
 :SOURCE           MMI
 :SCANT            2560ms

DEFAULT MR
 :NAME
 :ACT              1
 :SOURCE           PC
 :SCANT            640ms
 :UNIT             %
 :RANGEMAX         100.000
 :RANGEMIN         0.0
 :INITVAL          0.0
 :DS_COM           NONE
 :DSP_BUS          0
 :DSP_STAT         1
 :DSP_IDNT         1
 :DSP_CYCL         1024
 :DSP_REF          1
 :MMI_USE          NO
 :DESCR
 :DEC              2

MR2                MR
 :NAME             MR2
 :SOURCE           MMI
```

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